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ABSTRACT

This collection of lessons is designed to be presented in a sequence of five class sessions. It is designed for fifth-grade, above-average achievers. Lessons are intended to help students understand the importance of conserving energy. It stresses the role the student will play in the evolving energy situation. A list of free or inexpensive resources and their sources is provided. (RE)

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BASIC ENERGY OVERVIEW

by Jo Ann Owens

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

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Basic Energy Overview

The resources and materials used in this unit are free or can be borrowed at no cost. Materials should be ordered before starting the unit, using ordering information on the resource page.

Basic Energy Overview

RATIONALE:

Our world is in the midst of a serious energy problem and we are using our energy at a faster rate each year. Our freedom, our economy, and even our lives depend on how the future generations conserve this energy and find ways to produce other sources. In this unit, an effort is made to make students aware of their responsibilities in this area.

SUGGESTED SUBJECT AREA:

Science

DESCRIPTION OF STUDENTS:

Fifth grade, above-average achievers

GOAL:

The fifth grade students will understand the importance of conserving energy. They will be conscious of the many ways in which they can help and will realize that the future of energy depends on them.

OBJECTIVES:

Given a list of energy terms, the students will be able to orally define them or write the definitions.

Given an unlabeled pie chart, the students will be able to label, and verbally explain how the total energy usage in the U. S. is divided among the various users.

The students will formulate a verbal list of the problems associated with energy shortages through newspaper articles, magazine articles, television and radio programs, and news broadcasts.

In discussions, the students will evaluate methods which they may practice to conserve energy.

Through panel discussions, the students will be able to determine which energy consumers should receive first priority.

Students will be able to write a short essay describing some of the energy alternatives for the future.

Vocabulary - This list of words is not a complete list but these are words commonly used in the news media.

1. Atom - The basic building block of all matter -- the smallest unit of an element that still has the properties of that element.

2. Coal - Solid fuel produced from fossils of plants which lived millions of years ago. It is mostly carbon.

3. Crude Oil - Liquid fuel formed from fossils of plants and animals at the bottom of a sea millions of years ago. Petroleum as it comes from the ground.

4. Energy - The ability to do work or make things move.

5. Fossil Fuels - Any fuels formed by fossils of plants and animals millions of years ago. They are coal, petroleum, and natural gas.

6. Fuel - Anything that can be burned to produce heat energy.

7. Geothermal Energy - Heat produced deep within the earth.

8. Horsepower - A unit that measures the rate at which energy is produced or used.

9. Natural Gas - A gaseous fuel formed by fossils of ancient plants and animals.

10. Nuclear Power - Energy produced by splitting atoms in a nuclear reactor.

11. Solar Energy - Energy from the sun.

12. Solar Power - Electricity, heat, or other useful energy produced from sunshine.

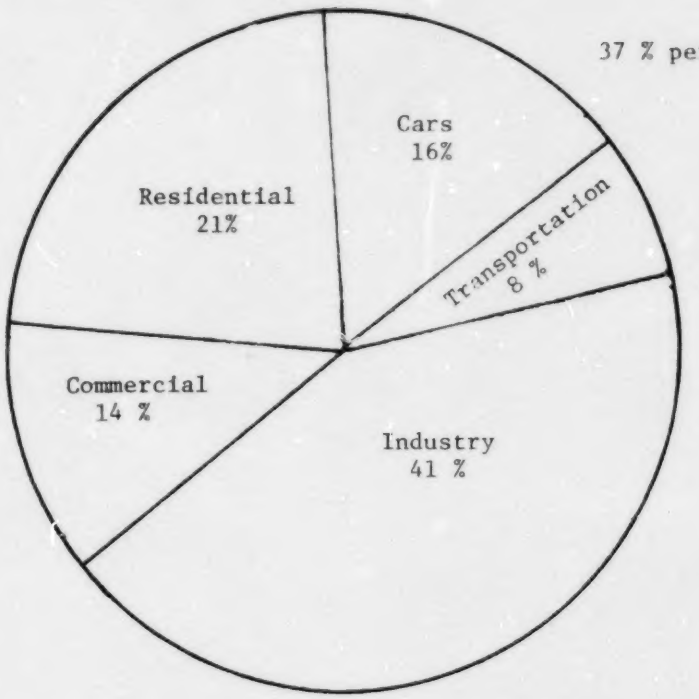
INTRODUCTORY CONTENT:

The United States enjoys a standard of living that no other country has ever achieved. Most of this has been accomplished through man's creativity in tapping our energy sources. It was less than 100 years ago that the first central-power-generating station turned on the lights in a single block of New York City. Now, electricity is essential to our civilization.

Petroleum products had been used for making patent medicine, lamps and heating. Gasoline had been a wasted by-product. After the internal-combustion engine was invented, the demand for oil grew. Now, we have millions of cars, trucks and buses crowding our highways and they have become our biggest polluters.

In the United States, we use more than 30 times the amount of energy we used 100 years ago. Energy consumption by individual Americans and by United States industries keeps increasing. We have only 6 percent of the world's population, but we use about 1/3 of the world's energy. At this rate, we will use as much energy in the next 20 years as we have used in all our past history.

Today's Energy Use



63 % Business and Government

Natural gas has become popular as a source of energy because it is cheap and clean. However, it is being used up rapidly and being discovered at a slower rate than we are using it. At the rate we are using it, our supply of ratural gas will be depleted by the end of this century. Today, more than 75 percent of our energy needs are met by natural gas and petroleum. Nearly half of the petroleum we used in 1977 was imported. This causes the United States to become dependent on the oil producing nations.

By the year 2000, it is expected that we will be using about three times as much energy as we are using today. To expand this energy supply, we have five basic sources -- coal, oil, gas, nuclear power, and hydropower.

Energy in the United States has been cheap and its availability has resulted in a lot of waste. We must learn to conserve energy and the existing energy supply as well as develop alternative energy sources.

DAY 1

Objective:

Given a list of energy terms, the students will be able to orally define them or write the definitions.

Given an unlabeled pie chart, the students will be able to label and verbally explain how the total energy usage in the United States is divided among the users.

Purpose:

To motivate the students' interest about energy and problem solving; to become familiar with general energy terms used in news media; and to understand and be able to explain a chart showing how the energy is distributed.

Activities:

1. Introduce the unit by having the children make a list of everything they used, from the time they were awakened until they came to school, which consumed energy.

2. Put a list of vocabulary words on the board to be copied by the children. Allow the children to orally express their ideas of what the words mean. Develop an acceptable definition from their ideas to write on the board. Have the children copy these definitions.

3. Use a flannel board and construction paper of different colors. Cut our portions representing the different users of energy. The portions should be cut ahead of time in correct percentage proportions. Write the name of the user and the percentage on each portion. Have a child come up and place each portion on the flannel board to form a pie.

Evaluation:

Objective test included at end of unit.

DAY 2

Objectives:

The students will formulate a verbal list of the problems associated with energy shortages through newspaper articles, magazine articles, television and radio programs, and news broadcasts.

Purpose:

Recognize the everyday problems that the energy shortage is causing throughout our country.

Activities:

1. Collect newspaper and magazine articles on the energy crisis. Use these to make bulletin board displays after discussion of each article.

2. Have each child compose a short story around the possible results of an energy failure. Let the children read their stories aloud.

   This short story can be used as an evaluation of the child's understanding of some of the problems we will possibly face in the future.

Evaluation:

Objective test included at end of unit.

DAY 3

Objective:

The students will evaluate by discussion methods which they may practice to conserve energy.

Purpose:

Understand that each person has a responsibility in conserving energy.

Materials Needed:

Slide projector, handouts, colors, pencils.

Activity:

Show the slide series titled "Wilma, The Wise Owl". (See resource list.) Use the discussion guide along with the slides. Pass out "Wilma" handout and let the children read it silently and color the pictures. Discuss the handout.

Evaluation:

Each student should contribute at least one energy conservation idea to the discussion.

DAY 4

Objective:

Through panel discussion, the students will be able to determine which energy consumers should receive first priority.

Purpose:

To realize how difficult it is for the government to pass an energy law which would please everyone.

Activities:

1. Select three children (volunteers) to represent industry, schools, and homes. Let them prepare in advance an argument for their group to receive first priority in case of a curtailment of energy. Have the children form a panel to discuss their reasons for believing they should be first. After the discussion, have the other children in the class vote on the group they think should be considered first.

2. Have each child assume that he or she is a congressman. Write a law which would reduce fuel consumption and be as fair as possible to everyone. Have these read aloud.

Evaluation:

Each student should make at least one contribution to the discussion.

DAY 5

Objective:

The student will be able to write a short essay describing some of the energy alternatives for the future.

Purpose:

To help the student to realize that our future energy situation is controlled by what he does.

Materials Needed:

Comic book handouts titled "Mickey Mouse and Goofy Explore Energy", (see resource list), pencils, colors and roll of white paper.

Activities:

1. Divide the students into groups (preferably four groups). Pass out the comic books and find the time line on the development of energy in the back of the book. Let three of the groups draw one section of the time line. Let the fourth group draw a time line of the future items they think could possibly be added by their generation. Let each group explain their part of the time line to the rest of the groups. Put the time line around the room in sequence.

2. Write a short essay on the energy alternative that you think is the best energy source of the future. Give your reason or reasons for selecting that particular alternative. The most common alternatives are coal, oil, gas, nuclear power, hydro-power, and geothermal power.

   An activity that could be used over the whole unit is a collage made of energy words and pictures cut from newspapers, magazines, and pamphlets. This would require collecting over a period of time (probably from the first day you start the unit) and used as a culminating activity.

Evaluation:

Each student should submit an essay for evaluation. The teacher should use pre-set criteria in assessing the essay (e.g., no punctuation or grammar mistakes, introduction, at least one point, conclusions, no spelling mistakes, etc.).

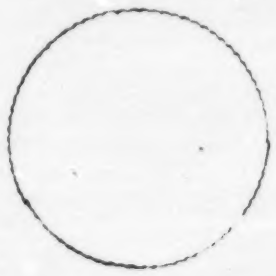
Evaluation:

The following objective test can be given to evaluate the student's achievement of the first three objectives.

1. Define these terms.

   Atom-
   Coal-
   Crude Oil-
   Energy-
   Fossil Fuels-
   Geothermal Energy-
   Horsepower-
   Natural Gas-
   Nuclear Power-
   Solar Energy-
   Solar Power-

2. Label the following chart. Explain how the total energy usage in the U. S. is divided among the various users.



3. Write a list of at least three problems associated with the energy crisis.

The last three objectives should be evaluated as they occur. Notes on these are included within the unit.

Available Resources - Free and Inexpensive Materials

Citizens' Workshop on Energy and the Environment Handbook
DOE Technical Information Center
P. O. Box 62
Oak Ridge, TN 37830

"Mickey Mouse and Goofy Explore Energy"
Exxon Company
Public Affairs Department
P. O. Box 2180
Houston, TX 77001

"Our Energy Problems and Solutions"
Available from
Kitty Borah
Shell Oil Company
P. O. Box 2463
Houston, TX 77001

"The Energy Primer"
Tennessee Valley Authority
Box 470
Tupelo, MS 38801

Wilma, the Wise Owl (slide series)
Available from
Mississippi Energy Extension Center
P. O. Box 5406
Mississippi State, MS 39762